

# SUBJECT INDEX

<b>A</b>	
Acid linings . . . . .	526
Additives and binders, Effect of, on high temperature properties of foundry sands . . . . .	266-273
A.F.S. clay defined . . . . .	53
A.F.S. Committee report . . . . .	218
A.F.S. fineness test on sand . . . . .	53-67
A.F.S. research reports . . . . .	125-217
Air blast temperature . . . . .	742
Air furnace refractory practice in cupola-air furnace duplexing . . . . .	570-573
Air furnaces, batch type, Refractory selection applied to . . . . .	497-500
Air heaters . . . . .	489
Air pollution . . . . .	364-370
Air pollution and the cupola . . . . .	714-717
Air sampling technique . . . . .	714
Air scrubbing, Reclaiming used molding sand by . . . . .	296-299
Alloying zirconium to magnesium . . . . .	581-594
Alloys, Substitution of boron for, in cast steels . . . . .	797-802
Aluminum, Alloying elements in . . . . .	453
Aluminum research report . . . . .	125-136
Aluminum bronze, Use of, in high pressure castings . . . . .	552-557
Aluminum casting alloys, High strength non heat treated . . . . .	453-461
Aluminum casting alloys, Zinc in . . . . .	517-524
Aluminum, Hot tearing in . . . . .	820
Aluminum, Influence of, on nodular cast iron . . . . .	446
Aluminum, Influence of, on properties of cast gun metal and removal of aluminum by slag . . . . .	75-83
Aluminum, Investment casting of . . . . .	789-796
Aluminum metal patterns . . . . .	530
Aluminum, Removal of, by slag from cast gun metal . . . . .	75-83
Aluminum sand casting defects . . . . .	371-384
Annealing control in malleable foundry . . . . .	661
Annealing time, Malleable iron . . . . .	470-476
Antimony, Influence of, on nodular cast iron . . . . .	443
Apprenticeship, Joint, council . . . . .	318
Apprentice, Pattern, training program . . . . .	482-484
Apprentice training . . . . .	317-321
Apprentice training statistics . . . . .	317-318
Arsenic, Influence of, on nodular cast iron . . . . .	445
Atmosphere, furnace, Sampling . . . . .	624
Atmosphere, mold, Influence of, on fluidity of cast iron . . . . .	726
Automatic chucking of castings . . . . .	529
<b>B</b>	
Back-pressure and sprue-base problem . . . . .	132
Bag houses for dust collection . . . . .	368
Baked synthetic sand . . . . .	248
Baking, core . . . . .	218, 236
Banking the cupola . . . . .	752
Basic cupola . . . . .	741
Design . . . . .	344-350
Production experiences with . . . . .	262-265
Refractories for . . . . .	341
Basic heats, Steel . . . . .	740-755
Basic-lined water-cooled cupola, Melting iron in a . . . . .	385
Basic lining materials, Physical properties of . . . . .	684
Basic refractories . . . . .	385-388
For cupola service . . . . .	386
Properties of . . . . .	346
Basicity, slag, Effect of varying degrees of . . . . .	497-500
Batch-type air furnaces, Refractory selection applied to . . . . .	360
Bentonite . . . . .	360
calcium . . . . .	360
sodium . . . . .	708
Bibliography on spherulitic graphite cast iron . . . . .	266-273
Binders and additives, Effect of, on high temperature properties of foundry sands . . . . .	442
Bismuth, Influence of, on nodular cast iron . . . . .	627-634
Black-heart malleable iron, Effect of phosphorus content on graphitization rate and mechanical properties of . . . . .	44-52
Blast cupola, Metallurgical . . . . .	109
Blow hole defined . . . . .	
and gases in foundry practice . . . . .	109-124
General character of . . . . .	120
Origin of . . . . .	110
Blows in aluminum castings . . . . .	363, 377
Boiling point of magnesium . . . . .	101
Bonding, Nature of, in clays and sand-clay mixtures . . . . .	356-363
Bonus, Calculating total . . . . .	434
Boron recovery and fading in cast steels . . . . .	798
Boron, Substitution of, for alloys in cast steels . . . . .	797-802
Brazing of aluminum . . . . .	458
Brittle fracture in aluminum castings . . . . .	374, 376
Bronze, aluminum, Use of, in high pressure castings . . . . .	552-557
Bronzes, tin, Effect of lead in commercial . . . . .	608
Buckle, Sand, in aluminum castings . . . . .	373, 374
Buckling tests . . . . .	210
<b>C</b>	
Calcined clay mix mold material . . . . .	247
Calcium bentonite . . . . .	360
Capaco process . . . . .	351
Carbide, injected, Steel desulphurization with . . . . .	337-343
Carbon . . . . .	740
control in cupola . . . . .	692
Effect of, in nodular iron . . . . .	326
loss in nodular iron . . . . .	15
pick-up . . . . .	
Cast iron . . . . .	312-316
Effect of cerium on graphite formation in alloy . . . . .	611-616
Effect of sulphur on fluidity of gray . . . . .	725-739
Factors affecting fluidity of . . . . .	650-654
magnesium treated, Effect of percentage of nodular graphite on certain mechanical properties of . . . . .	687-713
Mechanical properties of spherulitic graphite . . . . .	459
Castability of aluminum . . . . .	478
Cement mixing for patterns . . . . .	638
Cementite, Subcritical graphitization of . . . . .	368
Centrifugal dust collectors . . . . .	494
Dry rotary . . . . .	486
Centrifugal fan impellers . . . . .	13
Cerium . . . . .	449, 450
Amount of, for neutralization in nodular cast iron . . . . .	312-316
Effects of, on graphite formations in alloy cast iron . . . . .	59
Cheers shaker . . . . .	559
Chemical properties of olivine . . . . .	
Chills . . . . .	390
behavior . . . . .	21
Advantages of . . . . .	389-400
Application of, to increasing the feeding range of risers . . . . .	395
Evaluation of high conductivity . . . . .	718-724
Chipping, rough, Standards for . . . . .	529
Chucking, Automatic, of castings . . . . .	372-374
Clay balls in aluminum castings . . . . .	
Clays . . . . .	356-363
Nature of bonding in, and sand-clay mixtures . . . . .	268
Properties of . . . . .	368
Cloth filters for dust collection . . . . .	490
Cloth tube dust collector . . . . .	493
Cloth type dust collectors . . . . .	645
Coarse grain in magnesium castings . . . . .	247
Coated sand . . . . .	
Coke . . . . .	85
Analysis of Indian . . . . .	344
Properties of . . . . .	367
Collectors, dust, Available types . . . . .	842
Colloidal graphite . . . . .	812
Compressibility, A measure of, for sand by density ratio . . . . .	
Contaminants, air . . . . .	367
Reducing concentration of . . . . .	366
Source of . . . . .	742
Control instrument, Temperature recording . . . . .	106
Control, Production, of nodular iron . . . . .	463
Control, Quality, chart . . . . .	

# SUBJECT INDEX

<b>A</b>	
Acid linings . . . . .	526
Additives and binders, Effect of, on high temperature properties of foundry sands . . . . .	266-273
A.F.S. clay defined . . . . .	53
A.F.S. Committee report . . . . .	218
A.F.S. fineness test on sand . . . . .	53-67
A.F.S. research reports . . . . .	125-217
Air blast temperature . . . . .	742
Air furnace refractory practice in cupola-air furnace duplexing . . . . .	570-573
Air furnaces, batch type, Refractory selection applied to . . . . .	497-500
Air heaters . . . . .	489
Air pollution . . . . .	364-370
Air pollution and the cupola . . . . .	714-717
Air sampling technique . . . . .	714
Air scrubbing, Reclaiming used molding sand by . . . . .	296-299
Alloying zirconium to magnesium . . . . .	581-594
Alloys, Substitution of boron for, in cast steels . . . . .	797-802
Aluminum, Alloying elements in . . . . .	453
Aluminum research report . . . . .	125-136
Aluminum bronze, Use of, in high pressure castings . . . . .	552-557
Aluminum casting alloys, High strength non heat treated . . . . .	453-461
Aluminum casting alloys, Zinc in . . . . .	517-524
Aluminum, Hot tearing in . . . . .	820
Aluminum, Influence of, on nodular cast iron . . . . .	446
Aluminum, Influence of, on properties of cast gun metal and removal of aluminum by slag . . . . .	75-83
Aluminum, Investment casting of . . . . .	789-796
Aluminum metal patterns . . . . .	530
Aluminum, Removal of, by slag from cast gun metal . . . . .	75-83
Aluminum sand casting defects . . . . .	371-384
Annealing control in malleable foundry . . . . .	661
Annealing time, Malleable iron . . . . .	470-476
Antimony, Influence of, on nodular cast iron . . . . .	443
Apprenticeship, Joint, council . . . . .	318
Apprentice, Pattern, training program . . . . .	482-484
Apprentice training . . . . .	317-321
Apprentice training statistics . . . . .	317-318
Arsenic, Influence of, on nodular cast iron . . . . .	445
Atmosphere, furnace, Sampling . . . . .	624
Atmosphere, mold, Influence of, on fluidity of cast iron . . . . .	726
Automatic chucking of castings . . . . .	529
<b>B</b>	
Back-pressure and sprue-base problem . . . . .	132
Bag houses for dust collection . . . . .	368
Baked synthetic sand . . . . .	248
Baking, core . . . . .	218, 236
Banking the cupola . . . . .	752
Basic cupola . . . . .	741
Design . . . . .	344-350
Production experiences with . . . . .	262-265
Refractories for . . . . .	341
Basic heats, Steel . . . . .	740-755
Basic-lined water-cooled cupola, Melting iron in a . . . . .	385
Basic lining materials, Physical properties of . . . . .	684
Basic refractories . . . . .	385-388
For cupola service . . . . .	386
Properties of . . . . .	346
Basicity, slag, Effect of varying degrees of . . . . .	497-500
Batch-type air furnaces, Refractory selection applied to . . . . .	360
Bentonite . . . . .	360
calcium . . . . .	360
sodium . . . . .	708
Bibliography on spherulitic graphite cast iron . . . . .	266-273
Binders and additives, Effect of, on high temperature properties of foundry sands . . . . .	442
Bismuth, Influence of, on nodular cast iron . . . . .	627-634
Black-heart malleable iron, Effect of phosphorus content on graphitization rate and mechanical properties of . . . . .	44-52
Blast cupola, Metallurgical . . . . .	109
Blow hole defined . . . . .	
and gases in foundry practice . . . . .	109-124
General character of . . . . .	120
Origin of . . . . .	110
Blows in aluminum castings . . . . .	363, 377
Boiling point of magnesium . . . . .	101
Bonding, Nature of, in clays and sand-clay mixtures . . . . .	356-363
Bonus, Calculating total . . . . .	434
Boron recovery and fading in cast steels . . . . .	798
Boron, Substitution of, for alloys in cast steels . . . . .	797-802
Brazing of aluminum . . . . .	458
Brittle fracture in aluminum castings . . . . .	374, 376
Bronze, aluminum, Use of, in high pressure castings . . . . .	552-557
Bronzes, tin, Effect of lead in commercial . . . . .	608
Buckle, Sand, in aluminum castings . . . . .	373, 374
Buckling tests . . . . .	210
<b>C</b>	
Calcined clay mix mold material . . . . .	247
Calcium bentonite . . . . .	360
Capaco process . . . . .	351
Carbide, injected, Steel desulphurization with . . . . .	337-343
Carbon . . . . .	740
control in cupola . . . . .	692
Effect of, in nodular iron . . . . .	326
loss in nodular iron . . . . .	15
pick-up . . . . .	
Cast iron . . . . .	312-316
Effect of cerium on graphite formation in alloy . . . . .	611-616
Effect of sulphur on fluidity of gray . . . . .	725-739
Factors affecting fluidity of . . . . .	650-654
magnesium treated, Effect of percentage of nodular graphite on certain mechanical properties of . . . . .	687-713
Mechanical properties of spherulitic graphite . . . . .	459
Castability of aluminum . . . . .	478
Cement mixing for patterns . . . . .	638
Cementite, Subcritical graphitization of . . . . .	368
Centrifugal dust collectors . . . . .	494
Dry rotary . . . . .	486
Centrifugal fan impellers . . . . .	13
Cerium . . . . .	449, 450
Amount of, for neutralization in nodular cast iron . . . . .	312-316
Effects of, on graphite formations in alloy cast iron . . . . .	59
Cheers shaker . . . . .	559
Chemical properties of olivine . . . . .	
Chills . . . . .	390
behavior . . . . .	21
Advantages of . . . . .	389-400
Application of, to increasing the feeding range of risers . . . . .	395
Evaluation of high conductivity . . . . .	718-724
Chipping, rough, Standards for . . . . .	529
Chucking, Automatic, of castings . . . . .	372-374
Clay balls in aluminum castings . . . . .	
Clays . . . . .	356-363
Nature of bonding in, and sand-clay mixtures . . . . .	268
Properties of . . . . .	368
Cloth filters for dust collection . . . . .	490
Cloth tube dust collector . . . . .	493
Cloth type dust collectors . . . . .	645
Coarse grain in magnesium castings . . . . .	247
Coated sand . . . . .	
Coke . . . . .	85
Analysis of Indian . . . . .	344
Properties of . . . . .	367
Collectors, dust, Available types . . . . .	842
Colloidal graphite . . . . .	812
Compressibility, A measure of, for sand by density ratio . . . . .	
Contaminants, air . . . . .	367
Reducing concentration of . . . . .	366
Source of . . . . .	742
Control instrument, Temperature recording . . . . .	106
Control, Production, of nodular iron . . . . .	463
Control, Quality, chart . . . . .	

- |  |                         |  |          |
|--|-------------------------|--|----------|
| Control, Statistical quality                               | 462-465                 | Dust collectors  | 490      |
| for steel foundry  | 536-538                 | Available types  | 367      |
| in a malleable iron foundry                                | 655-665                 | Wet type   | 494      |
| Control, Waste, principles                                 | 578-580                 |  |          |
| Coombs shaker  | 59                      | <b>E</b>   |          |
| Copper-base alloys, Effect of lead and nickel on grain     |                         | Exchange paper to A.F.S.                                       | 23-124   |
| size of cast   | 605-610                 | Expansion characteristics of olivine                           | 558      |
| Copper, Influence of, on nodular cast iron                 | 448                     | Expansion testing, Sand  | 210      |
| Copper-tin-nickel alloys                                   | 608                     | Educational force, Industry an                                 | 2        |
| Core baking  | 218                     | Electric furnace refractories                                  | 305      |
| Core boxes from core plugs                                 | 466-469                 | Electrodes, Welding  | 11       |
| Coremaking in India  | 87                      | Electrostatic precipitators for dust collection                | 368      |
| Coremaking, Statistical quality control in                 | 658                     | Elimination of gases from metals and alloys                    | 229-233  |
| Core sand mixtures   |                         |  |          |
| for gray iron  | 221                     | <b>F</b>   |          |
| for steel  | 139, 140, 146, 147, 157 | Fans for dirt removal  | 486      |
| Cores, Baking of   | 236                     | Fatigue data on nodular iron                                   | 653      |
| Cores, Influence of nature of oven atmosphere on drying of |                         | Feeding range of risers, Application of chills to increasing   | 389-400  |
| molds and baking of foundry                                | 234-246                 | Felt tube dry dust collector                                   | 491      |
| Cores, Use of olivine in                                   | 562                     | Felt tube dust collectors                                      | 493      |
| Cores, Veining tendencies                                  | 218-222                 | Ferrosilicon, Inoculation of iron with                         | 103      |
| Corrosion resistance of aluminum                           | 458                     | Finishing department control in malleable foundry              | 662      |
| Costs, standard, Pricing castings using                    | 756-765                 | Fire brick, Plastic  | 685      |
| Coulomb's equation   | 360, 361                | Fires during heat treatment of magnesium castings              | 648      |
| Cracks in aluminum castings                                | 377, 378                | First-stage malleablization (gamma-range graphitization)       | 637      |
| Croning process  | 477                     | Fineness number, Calculating, of sand                          | 53       |
| Use of olivine in  | 562                     | Fineness test on sand  | 53-67    |
| Crucibles, Slag attack on                                  | 81                      | Flowability of foundry sand                                    | 803-817  |
| Cumulative distribution curve                              | 61, 63                  | Fluidity test casting  | 9        |
| Cupola air blast temperature                               | 742                     | Flakes and nodular iron, Comparison of                         | 779      |
| Cupola-air furnace duplexing, Air furnace refractory       |                         | Flat cloth envelope dry dust collector                         | 491      |
| practice in  | 570-573                 | Floor gratings, Use of   | 567      |
| Cupola and air pollution                                   | 714-717                 | Fluidity, Effects of melting furnace atmosphere on, hot tear-  |          |
| Cupola banking   | 752                     | ing tendency, and other properties of malleable iron           | 169-181  |
| Cupola, basic  |                         | Fluidity measurements on nodular iron                          | 691      |
| Production experiences with                                | 344-350                 | Fluidity of cast iron  |          |
| refractories for   | 385-388                 | Effect of temperature on                                       | 732      |
| Cupola, Carbon control in                                  | 740                     | Factors affecting  | 725-739  |
| Cupola description   | 766                     | Effect of sulphur on   | 611-616  |
| Cupola forehearth refractories                             | 304                     | Fluidity test mold   | 8, 727   |
| Cupola history   | 44                      | Fluorides of zirconium   | 585      |
| Cupola, How iron and steel melt in a                       | 766-774                 | Forehearth refractories, Cupola                                | 304      |
| Cupola melting zone refractories                           | 300                     | Furnace atmosphere, Sampling                                   | 624      |
| Cupola, Metallurgical blast                                | 44-52                   | Furnace linings, Effect of slag on                             | 525-528  |
| Cupola operation   | 766                     | Furnace, Reverberatory   | 230      |
| Cupola, Refractories for basic                             | 262-265                 | Furnace roof refractories                                      | 306      |
| Cupola slags   | 525                     | Furnace, Heat treat, for magnesium castings                    | 643      |
| Cutting with ultra-high purity oxygen                      | 539-547                 |  |          |
| Cyclone type dust collector                                | 367                     | <b>G</b>   |          |
|  |                         | Gamma-range graphitization (first-stage malleablization)       | 637      |
| <b>D</b>   |                         | Ganister-fireclay mixes  | 684      |
| Defects, Aluminum sand casting                             | 371-384                 | Gas (hydrogen) porosity in aluminum castings                   | 381, 382 |
| Definitions:   |                         | Gas in suspension  | 119      |
| A.F.S. Clay  | 53                      | Gas (steam) porosity in aluminum casting                       | 383      |
| Blow hole  | 109                     | Gases and blow holes in foundry practice                       | 109-124  |
| Micron   | 365                     | Gases, Elimination of, from metals and alloys                  | 229-233  |
| Olivine  | 38                      | Gases in metals  | 110      |
| Standard costs   | 756                     | Gating and feeding nodular iron gear wheels                    | 226      |
| Training   | 274                     | Gating as applied to sprue-base design                         | 125-136  |
| Density, Test of   | 232                     | Gating practice, Effects of, on leak tightness of 85-5-5-5 and |          |
| Design of basic cupola                                     | 741                     | 81-3-7-9 alloy castings  | 287-295  |
| Desulphurization efficiency                                | 340                     | Gear wheels, Method of molding                                 | 224      |
| Desulphurization, Steel, with injected carbide             | 337-343                 | Germination in magnesium castings                              | 646      |
| Dewatering, Sludge, tank                                   | 453                     | Grading classification of sand                                 | 62       |
| Dilatometer for sand testing                               | 267                     | Grain size, Effect of lead and nickel on, of copper-base       |          |
| Dilatometer, Solidification, applied to gray iron          | 783-788                 | alloys   | 605-610  |
| Dimensional stability of aluminum castings                 | 459                     | Graphite, colloidal  | 842      |
| Dimensioning risers and heads                              | 93-100                  | Graphite formation in alloy cast iron, Effects of cerium on    | 312-316  |
| Driers, Core   | 531                     | Graphitization, Effect of hydrogen on                          | 635-640  |
| Dry cyclone dust collector                                 | 491, 494                | Graphitization rate, Effect of phosphorus content on, and      |          |
| Dry rotary centrifugal collectors                          | 494                     | mechanical properties of black-heart malleable iron            | 627-634  |
| Ducts for ventilation system                               | 488                     | Graphitization rates   | 630      |
| Duplexing, Air furnace refractory practice in cupola-air   |                         | Graphitization, Subcritical, of cementite                      | 638      |
| furnace  | 570-573                 | Gratings, floor, Use of  | 567      |
| Duplexing, Refractory practice as applied to malleable     | 300-307                 | Gray cast iron, Effect of sulphur on fluidity of               | 611-616  |
| Dust collecting systems, How to maintain foundry           |                         | Gray iron castings, Internal porosity in                       | 401-431  |
| ventilation and  | 485-496                 | Gray iron castings, Riserings                                  | 211-217  |
| Dust collector, Rotary centrifugal wet                     | 494                     | Gray iron  |          |
|  |                         | Hot tear formation in  | 508      |
|  |                         | Hot tearing temperature range for                              | 509      |

Influence of phosphorus on hot tear resistance of plain and alloy	501-510
Solidification dilatometer applied to gray iron	783-788
Volume changes in	421
Green synthetic sand	248
Gun metal	555, 556
castings, Causes of porosity in	76
Influence of aluminum on properties of cast, and removal of aluminum by slag	75-83
Gypsum cements in patternmaking	477-481
Gypsum sand mold process	480
<b>H</b>	
Hackley Manual Training School	320
Hardenability of cast steels	797
Hard iron, Statistical quality control of	660
Heat flow in moist sand	163-168
Heat transfer considerations	90-100
Heat, Transfer of, from risers by convection, radiation and conduction	617
Heat treatment	
Effect of, on nodular iron	702
furnaces for magnesium castings	643
hazards (magnesium castings)	644
of magnesium alloy castings	641-649
of nodular irons	325
Principles of, of magnesium castings	641
High-alumina refractories	682
High-duty fireclay brick	681
High strength non heat-treated aluminum casting alloys	453-461
High temperature properties of foundry sands, Effect of binders and additives on	266-273
Hole, Sand, in aluminum casting	374, 375
Hoods for ventilation	489
Hot crack (solidification shrinkage crack) in aluminum casting	377
Hot strength-deformation recorder	205
Hot tear	
Elimination of	509
formation factors in gray iron	508
formation in steel castings	675-680
formation, Theory of	507
rating	11
resistance of plain and alloy gray iron, Influence of phosphorus on	501-510
test	183
Test casting	141
Evaluation of, in steel castings	137
Hot tearing	
Factors in	182
in aluminum	820
Mechanics of	182
temperature range for gray iron	509
tendency and other properties of malleable iron, Effects of melting furnace atmosphere on fluidity	169-181, 182-196
in steel castings	10, 14, 137-162, 821
Metallurgy and mechanics of	818-833
of malleable, Effect of Mn-S ratio on	177
of malleable, Effects of temperature on	176
Temperature of	820
vs carbon content in malleable	192
Hydraulic setting castable refractories	685
Hydrogen, Effect of, on graphitization	635-640
Hygienic considerations in use of olivine	559
Hygroscopicity of different compounds	81
Hyper-eutectic irons, Time of formation of spherulites in hypo- and	849-852
<b>I</b>	
Illite	356
Incentive plan	
for cleaning room	723-724
Melt department	432-438
Inclusions	
in aluminum castings	375, 376
Non-metallic, reduce fluidity of cast iron	726
sulphide, Form of	615
Inclyno sieve shaker	55-59
India, Foundry sand in	86
India, Melting units in	84
India, Patternmaking in	86
India, Steel foundries in	84-89
Industry an educational force	2
Industry flexible to change	3
Industry's responsibility to youth	1-5
Ingenuity, American	2
Injected carbide, Steel desulphurization with	337-343
Inoculation of iron with ferrosilicon	103
Inoculation of nodular irons	325
Inspection of castings	12
Inspection of castings in India	88
Inspectors, Training program for	514
Intermediate and low-duty fireclay brick	681
Internal porosity in	
aluminum castings	381, 382
gray iron castings	401-431
Investment casting of aluminum	789-796
Iron and steel, How, melt in a cupola	766-774
Iron, gray cast, Effect of sulphur on fluidity of	611-616
Iron, Melting, in a basic-lined water-cooled cupola	740-755
Iron, Nodular	
production	101-108
Solidification of, in sand molds	775-782
Iron ore, Analysis of Indian	85
<b>J</b>	
Job elements	578
Job opportunities	1-5
Joint apprenticeship council	318
<b>K</b>	
Kaolinite clays	356
Kirkstite tooling	477
<b>L</b>	
Labor turnover, Reduction of	277
Laboratory layout	8
Lanthanum	13
Lead and nickel, Effect of, on grain size of copper-base alloys	605-610
Lead, Effect of, in commercial tin bronzes	608
Lead, Influence of, on nodular cast iron	441
Leak tightness, Effects of mold materials on, and mechanical properties of 85-5-5-5 and 81-3-7-9 alloy castings	247-261
Leak tightness of 85-5-5-5 and 81-3-7-9 alloy castings, Effects of gating practice on	287-295
Linings, Effect of slag on furnace	525-528
Los Angeles and air pollution	365
Louver dust collectors	368
<b>M</b>	
Machining aluminum castings	459
Magnesium alloy castings, Heat treatment of	641-649
Magnesium, Alloying zirconium to	581-594
Magnesium boiling point	101
Magnesium melting point	101
Magnesium-rare earth-zirconium alloys	647
Magnesium, residual, Effect of, in nodular iron	697
Magnesium-treated cast iron, Effect of percentage of nodular graphite on certain mechanical properties of	650-654
Magnesium-treated nodular cast iron	439-452
Magnesium treatment for nodular iron	101
Magnesium vapor pressure vs temperature	101
Magnesium-zinc-zirconium alloys	648
Magnesium-zinc-zirconium alloys, Mechanical properties of sand cast	595-604
Magnetic powder inspection	12
Maintenance of foundry ventilation and dust collecting systems	485-496
Malleable and steel foundries, Patterns for high production	574-577
Malleable duplexing, Refractory practice as applied to	300-307
Malleable foundry	
annealing control	661
finishing department control	662
Quality control in a	655-665
soft iron control	662
Malleable iron	
annealing time	470-476



black-heart, Effect of phosphorus content on graphitization rate and mechanical properties of	627-634
Effects of melting furnace atmosphere on fluidity, hot tearing tendency, and other properties of	169-181
photomicrographs	473, 474, 632
Manganese, Effect of, in nodular iron	695
Mechanics and metallurgy of hot tearing	818-833
Mechanism for void formation in gray iron	423
Mechanism of the drying of sand	235
Meehanite metal	406
Melt department incentive plan	432-438
Melt, How iron and steel, in a cupola	766-774
Melt quality	536
Melting and pouring operations, non-ferrous, Ventilation at	563-569
Melting behavior of pig iron, cast iron, steel	769
Melting control in a malleable foundry	657
Melting furnace atmosphere, Effects of, on fluidity, hot tearing tendency and other properties of malleable iron	169-181
Melting in a high speed reverberatory furnace	624-626
Melting iron in a basic-lined water-cooled cupola	740-755
Melting point of magnesium	101
Melting practice for 85-5-5-5 and 81-3-7-9 alloys	248
Melting practice for steel	137
Melting units in India	84
Melting zone refractories, Cupola	304
Metal patternmaking	529-532
Metallurgical blast cupola	44-52
Metallurgy and mechanics of hot tearing	818-833
Methods, Industry seeks better	3
Micron defined	365
Microstructures of	
malleable iron	632, 633
nodular iron	651
spherulitic graphite cast iron	688, 691-702
Mineral perlite and its use in the foundry	666-674
Mischmetal	13
Misruns in aluminum castings	371
Mixing cement for patterns	478
Modulus of elasticity, Effect of section size on	690
Moisture determination	533
Mold atmosphere, influence of, on fluidity of cast iron	726
Mold hardness	
Effect of, on scabbing	26
Variation of permeability with	26
Moldability of foundry sands	814
Molding gear wheels, Method of	224
Molding in India	87
Molding material—olivine	38-43
Molding operations, Statistical quality control in	658
Molding sand, Reclaiming used, by air scrubbing	296-299
Molding sands, Preparation of	805
Molding sand test results, Influence of specimen tube loading and riddle size on	533-535
Mold materials, Effects of, on leak tightness and mechanical properties of 85-5-5-5 and 81-3-7-9 alloy castings	247-261
Molds, Drying of, Influence of nature of oven atmosphere on	234-246
Molds, Solidification of nodular iron in sand	775-782
Molds, Thermal properties of	91
Montmorillonite	356
Motion and timestudy, Motion pictures in foundry	308-311
Motion pictures, Advantages of, in timestudy	308
Motion pictures in foundry motion and timestudy	308-311
Mottling of malleable, Effects of atmosphere on	178
Mulling effects of olivine	561
Multiple cyclone dust collector	492, 494

## N

Natural green sand mix	248
Naturally-bonded molding sands	356
Neodymium	13
Nickel and lead, Effect of, on grain size of copper-base alloys	605-610
Nickel, Effect of, in nodular iron	700
Nitrogen, Use of, in steel production	340
Nodular and flake iron, Comparison of	779
Nodular cast iron, Magnesium-treated	439-452
Nodular graphite, A study of the formation of	834-848

Nodular graphite cast iron	223-228
Nodular graphite, Effect of percentage of, on certain mechanical properties of magnesium-treated cast iron	650-654
Nodular iron	
applications	107
bibliography	708
Carbon loss in	326
Effect of section size	700
fatigue data	653
inoculation	326
mechanical properties	104, 687-713
microstructures	651
production	101-108
production control	106
shrinkage characteristics	691
Solidification of, in sand molds	775-782

## Nodular irons

As-cast properties of	326
Commercial experience with higher silicon	322-329
Heat treatment of	325
Specifications for as-cast	328
Non-ferrous melting and pouring operations, Ventilation at	563-569

## O

## Olivine

application in the foundry	558-562
as a molding material	38-43
compared with silica sand	42
defined	38
in non-ferrous foundries	42
preparation	560
Properties of	558
Opportunities, Job	1-5
Oxygen, Cutting with ultra-high purity	539-547

## P

Particle size of aerosols	366
Pattern apprentice training program	482-484
Patternmaking in India	86
Patternmaking, Metal	529-532
Patternmaking to compensate for shrink allowance	477-481
Patterns for high production malleable and steel foundries	574-577
Patterns, wood, Building	548-551
Perlite	
in the core room	672
Mineral, and its use in the foundry	666-674
uses in molding sands	668
Permeability, Variation of, with mold hardness	26
Phosphide eutectic	
Photomicrographs of	413, 414, 421
properties	412
Phosphide volume changes	418
Phosphorus content, Effect of, on graphitization rate and mechanical properties of black heart malleable iron	627-634
Phosphorus, Effect of, in nodular iron	696
Phosphorus, Influence of, on hot tear resistance of plain and alloy gray iron	501-510
Photomicrographs of	
malleable iron	473, 474, 632
nodular iron	651, 688, 691-702
phosphide eutectic	413, 414, 421
white iron	471, 629
Physical properties of olivine	559
Pin corebox	531
Pinhole porosity in aluminum castings	380, 382
Pinholes in nodular iron	692
Plaster, Applications of permeable metal casting	351-355
Plaster, Theory of permeable	351
Plastic fire brick	685
Pneumatic reclamation for foundry sands	330-336
Pollution, Air	364-370
and the cupola	714-717
Porosity, Air, in aluminum casting	383
Porosity in gun metal castings, Causes of	76
Porosity, Internal, in gray iron castings	401, 431
Porosity (reaction) in aluminum casting	383
Porosity (steam) in aluminum casting	383

Pouring operations, Ventilation at non-ferrous melting and . . . . .	563-569	Rotary furnace steel, Manufacture of cast edge tools in . . . . .	68-74
Pouring temperature for 85-5-5-5 and 81-3-7-9 alloys . . . . .	250	Rough sandy surface in aluminum castings . . . . .	374-375
Pouring temperature of gun metal, Influence of, on strength and density . . . . .	77	Russian pig iron . . . . .	104
Praseodymium . . . . .	13	<b>S</b>	
Precipitator, Electrical . . . . .	717	Safety, Hygiene and Air Pollution Program . . . . .	279-281
Preparation of molding sands . . . . .	805	Safety, Single objective . . . . .	282-286
Pressure and volume relation . . . . .	787	Samarium . . . . .	13
Pressure castings, Use of aluminum bronze in high . . . . .	552-557	Sample, sand, Preparation of . . . . .	533
Pressure tightness, Test for . . . . .	75	Sampling furnace atmosphere . . . . .	624
Pricing castings using standard costs . . . . .	756-765	Sand buckle in aluminum castings . . . . .	373, 374
Production control of nodular iron . . . . .	106	Sand-clay mixtures, Nature of bonding in clays and . . . . .	356-363
Properties, High temperature, of foundry sands, Effect of binders and additives on . . . . .	266-273	Sand control and scabbing prevention . . . . .	23-37
Pyknometer for liquid density determination . . . . .	418	Sand, drying of, Mechanism of the . . . . .	235
<b>Q</b>		Sand expansion . . . . .	24
Qualification of welders . . . . .	12	Sand explosions in aluminum castings . . . . .	372, 373
Quality control . . . . .		Sand, Flowability of foundry . . . . .	803-817
Elements of . . . . .	462	Sand line or rat-tail in aluminum casting . . . . .	373, 374
in steel jobbing foundry . . . . .	536-538	Sand mixing procedure . . . . .	218
in a malleable iron foundry . . . . .	655-665	Sand mixture, Core, for steel . . . . .	139, 140, 146, 147, 157
Principles of . . . . .	655	Sand mixture preparation . . . . .	197
Statistical . . . . .	462-465, 511-516	Sand in India . . . . .	86
Quench crack in aluminum casting . . . . .	378	Sand sample, Preparation of . . . . .	533
Quenching charges in cupola stack . . . . .	767	Sand scrubbing cell, Drawing of . . . . .	331
<b>R</b>		Sand stress-strain curves . . . . .	267
Radiographic inspection . . . . .	12	Sand test results, molding, Influence of specimen tube loading and riddle size on . . . . .	533-535
Rat-tail in aluminum castings . . . . .	373, 374	Sand test specimen preparation . . . . .	197
Raw materials in India . . . . .	85	<b>Sands</b>	
Reaction gases in metals . . . . .	114	Effect of binders and additives on high temperature properties of foundry . . . . .	266-273
Reaction porosity in aluminum casting . . . . .	383	Naturally-bonded molding . . . . .	356
Reclaimed core and molding sands, Properties of . . . . .	296, 298	Pneumatic reclamation for foundry . . . . .	330-336
Reclaimed sand, Uniformity of . . . . .	297	Standard . . . . .	62
Reclaiming used molding sand by air scrubbing . . . . .	296-299	Steel, at elevated temperatures . . . . .	197-210
Reclamation, Pneumatic, for foundry sands . . . . .	330-336	Synthetic molding . . . . .	356
Refining and elimination of gases from metals and alloys . . . . .	229-233	Scab formation . . . . .	201
Refractories . . . . .		Scab, Sand, in aluminum castings . . . . .	373, 375
Basic, for cupola . . . . .	262-265, 385-388	<b>Scabbing</b>	
Classification of . . . . .	681	Prevention of . . . . .	23-27
for slag hole . . . . .	345	reduced by increasing deformation of dried sand . . . . .	27
for tap hole . . . . .	345	test castings . . . . .	27
Fundamentals of foundry . . . . .	681-686	tests . . . . .	207
life in basic cupola . . . . .	743	Scabs, Formation of . . . . .	23
lining and patching in basic cupola . . . . .	344	Scatter diagram in quality control . . . . .	464
lining, Consumption of . . . . .	263	Screens in gating system . . . . .	133
lining materials for cupola . . . . .	386	Section size, Effect of, on modulus of elasticity . . . . .	690
mixtures, Ingredients in . . . . .	263	Selby jolter . . . . .	55
practice, Air furnace, in cupola-air furnace duplexing . . . . .	570-573	Shake-out exhaust hood . . . . .	489
practice as applied to malleable duplexing . . . . .	300-307	Shakers, Sand, Comparison of . . . . .	66
selection applied to batch-type air furnaces . . . . .	497-500	Shear angle test for flowability . . . . .	808
Research foundry unit, Role of . . . . .	6-15	<b>Shell molding</b>	
Research organization chart . . . . .	6	process . . . . .	14, 477
Responsibility of top management in training . . . . .	274-278	Use of olivine in . . . . .	562
Reverberatory furnace . . . . .	230	Shrink allowance, Patternmaking to compensate for . . . . .	477-481
Melting in a high speed . . . . .	624-626	<b>Shrinkage</b>	
Riddle size and specimen tube loading, Influence of, on molding sand test results . . . . .	533-535	characteristics of nodular iron . . . . .	691
Riser and head dimensioning . . . . .	93-100	concept . . . . .	410
Riser dimensions . . . . .	20	crack in aluminum castings . . . . .	377, 378
Riser materials . . . . .	620	test . . . . .	232
Riser size and expansion . . . . .	785	<b>Sieve shakers:</b>	
Riser treatments, A simplified analysis of . . . . .	617-623	Inclyno . . . . .	55
Risering . . . . .		Ro-tap . . . . .	54
castings . . . . .	16-22	Selby . . . . .	55
gray iron castings . . . . .	211-217	Sieves, Method for calibrating . . . . .	60, 64
Influence of, on porosity in gray iron castings . . . . .	406	Sieves, Standard, Data on . . . . .	56
uniform sections . . . . .	17	Silica refractories . . . . .	683
Risers . . . . .		Silicon, Effect of, in nodular iron . . . . .	694
Application of chills to increasing feeding range of . . . . .	389-400	Silicon, higher, nodular irons, Commercial experience with . . . . .	322-329
Transfer of heat from, by convection, radiation and conduction . . . . .	617	Silicosis . . . . .	38, 279
unshielded steel, Analysis of, in sand . . . . .	618	Single gang booked core box and master drier pattern . . . . .	468
Roof, furnace, Refractories . . . . .	306	Single gang dump box . . . . .	466
Ro-tap sieve shaker . . . . .	54-59	Sisal fiber, Use of . . . . .	479
Rotary centrifugal . . . . .		<b>Slag</b>	
dry dust collector . . . . .	494	attack on crucibles . . . . .	81
wet dust collector . . . . .	494	basicity, Effect of varying degrees of . . . . .	346
		composition . . . . .	348
		Effect of, on furnace linings . . . . .	525-528

- hole refractories . . . . . 345  
 Potential solubility of . . . . . 262  
 Sludge dewatering tank . . . . . 493  
 Sludge settling tanks . . . . . 495  
 Sodium bentonite . . . . . 360  
 Soft iron control in the malleable foundry . . . . . 662  
 Soft ram in aluminum casting . . . . . 374, 375  
 Solidification dilatometer applied to gray iron . . . . . 783-788  
 Solidification of nodular iron in sand molds . . . . . 775-782  
 Solidification shrinkage crack in aluminum casting . . . . . 377  
 Solution treatment of magnesium castings . . . . . 647  
 Sonic wet agglomeration system . . . . . 717  
 Space, Time and temperature relations in casting of metals . . . . . 90-100  
 Specifications for as-cast nodular irons . . . . . 328  
 Specimen tube loading and riddle size, Influence of, on molding sand test results . . . . . 533-535  
 Spheroidal graphite cast iron, Production of heavy gear wheels in . . . . . 223-228  
 Spherulites, Time of formation of, in hypo- and hyper-eutectic irons . . . . . 849-852  
 Spherulitic graphite cast iron, Mechanical properties of . . . . . 687-713  
 Spherulitic graphite cast iron microstructures . . . . . 688, 691-702  
 Sprue-base design in gating . . . . . 125-136  
 Stabilizing treatment for magnesium castings . . . . . 647  
 Stack, Quenching charges in . . . . . 767  
 Stack, Removing charges from cupola . . . . . 767  
 Standard costs defined . . . . . 756  
 Standard costs, Pricing castings using . . . . . 756-765  
 Standard sands . . . . . 62  
 Standards for rough chipping and removing welds . . . . . 718-724  
 Static spray washers for dust collection . . . . . 368  
 Statistical quality control . . . . . 462-465, 511-516  
   in steel foundry . . . . . 536-538  
   in malleable iron foundry . . . . . 655-665  
 Statistics on apprentice training . . . . . 317-318  
 Steel and malleable foundries, Patterns for high production . . . . . 574-577  
 Steel  
   castings, Hot tears in . . . . . 137-162, 675-680  
   core sand mixtures . . . . . 139, 140, 146, 147, 157  
   desulphurization with injected carbide . . . . . 337-343  
   foundries in India . . . . . 84-89  
   Hot tearing in . . . . . 821  
   How iron and, melt in a cupola . . . . . 766-774  
   jobbing foundry, Quality control for . . . . . 536-538  
   melting practice . . . . . 137  
   sands, Properties of, at elevated temperatures . . . . . 197-210  
   Substitution of boron for alloys in cast . . . . . 797-802  
 Stokes law . . . . . 119  
 Stress-strain curves for sand . . . . . 200, 267  
 Stress-strain and expansion data on steel sands . . . . . 197  
 Structure changes in magnesium castings on heat treatment . . . . . 642  
 Subcritical graphitization of cementite . . . . . 638  
 Subversive elements in nodular cast iron . . . . . 439  
 Sulphide inclusions, Form of . . . . . 615  
 Sulphur absorption in refining gun metal . . . . . 81  
 Sulphur, Effect of, on fluidity of gray cast iron . . . . . 611-616  
 Super-duty fireclay refractories . . . . . 682  
 Swedish pig iron . . . . . 104  
 Synthetic molding sands . . . . . 356  
 Synthetic sand:  
   Green . . . . . 248  
   Baked . . . . . 248
- T**
- Tap hole refractories . . . . . 345  
 Temperature gradients . . . . . 19  
 Temperature measurement . . . . . 8  
 Temperature of hot tearing . . . . . 820  
 Temperature recording control instrument . . . . . 742  
 Thermocouple . . . . . 9, 10  
   location in molds . . . . . 784  
 Thermal conductivity of olivine . . . . . 559  
 Thermal properties of  
   aggregate molding materials . . . . . 621
- molds . . . . . 91  
 olivine . . . . . 558  
 Timestudy, Motion pictures in foundry motion and . . . . . 308-311  
 Tin bronzes, Effect of lead in commercial . . . . . 608  
 Tin, Influence of, on nodular cast iron . . . . . 444  
 Titanium, Influence of, on nodular cast iron . . . . . 447  
 Tools, cast edge, Manufacture of, in rotary furnace steel . . . . . 68-74  
 Torsion test . . . . . 232  
 Training  
   Apprentice . . . . . 317-321  
   defined . . . . . 274  
   Justification for . . . . . 277  
   objectives . . . . . 275  
   program for inspectors . . . . . 514  
   Responsibility of top management in . . . . . 274-278  
 Transfer ladle refractories . . . . . 304  
 Transfer of heat from risers by convection, radiation and conduction . . . . . 617
- V**
- Valve body pattern . . . . . 530  
 Veining tendencies of cores . . . . . 218-222  
 Veining vs  
   base sands . . . . . 221  
   bentonite additions . . . . . 222  
   core baking time . . . . . 220  
   core oil content . . . . . 221  
   metal temperature . . . . . 220  
   moisture . . . . . 220  
   percentage of cereal binder . . . . . 222  
   sand additives . . . . . 221, 222  
   sand grain size . . . . . 221  
   synthetic resins and other binders . . . . . 222  
   type of cereal binder . . . . . 222  
   type of core oil . . . . . 222  
   varying blends of lake and bank sands . . . . . 222  
 Ventilation and dust collecting systems, Maintaining foundry . . . . . 485-496  
 Ventilation at non-ferrous melting and pouring operations . . . . . 563-569  
 Venturi scrubber in dust collection . . . . . 368  
 Void formation in gray iron, Mechanism for . . . . . 423  
 Volume changes in gray iron . . . . . 421
- W**
- Waste control principles . . . . . 578-580  
 Water-cooled cupola, Melting iron in a basic-lined . . . . . 740-755  
 Welder qualification . . . . . 12  
 Welding electrodes . . . . . 11  
 Welds, removing, Standards for . . . . . 718-724  
 Wet cyclone dust collector . . . . . 492-494  
 Wet rotary centrifugal collector . . . . . 495  
 Wet type dust collectors . . . . . 494  
 White iron . . . . . 630  
   photomicrographs . . . . . 471, 629  
 Wood flour  
   Effect of . . . . . 35, 37  
   Use of . . . . . 33  
 Wood patterns, Practical suggestions for building . . . . . 548-551
- X**
- X-ray method of hot tearing determination . . . . . 821-824, 827-830
- Y**
- Youth, Industry's responsibility to . . . . . 1-5
- Z**
- Zinc-base alloys shrinkage . . . . . 478  
 Zinc in aluminum casting alloys . . . . . 517-524  
 Zirconium, Alloying, to magnesium . . . . . 581-594  
 81-3-7-9 and 85-5-5-5 alloy castings, Effect of gating practice on leak tightness of mold materials on leak tightness of . . . . . 287-295  
 85-5-5-5 and 81-3-7-9 alloy castings, Effect of gating practice on leak tightness of mold materials on leak tightness of . . . . . 247-261

## AUTHOR INDEX

ABCOUWER, J. S.—Practical Consequences of Space, Time and Temperature Relations During Casting of Metals . . . . .	90
ACKERLIND, C. G., MOREY, R. E. and PELLINI, W. S.—Effect of Binders and Additives on the High Temperature Properties of Foundry Sands . . . . .	266
ACKERLIND, C. G., PELLINI, W. S. and BISHOP, H. F.—Metallurgy and Mechanics of Hot Tearing . . . . .	818
ADAMS, C. M., BHATTACHARYA, U. K. and TAYLOR, H. F.—Hot-Tear Formations in Steel Castings . . . . .	675
ADAMS, C. M., KEVERIAN, J. and TAYLOR, H. F.—Time of Formation of Spherulites in Hypo- and Hyper-Eutectic Irons . . . . .	849
ADAMS, C. M. JR., and TAYLOR, H. F.—A Simplified Analysis of Riser Treatments . . . . .	617
A.F.S. COMMITTEE REPORT—Veining Tendencies of Cores . . . . .	218
ALLAN, J. R.—A.F.S. Safety, Hygiene, and Air Pollution Program . . . . .	279
BATTY, A. T., KEECH, G., and DUMMETT, N. M.—Manufacture of Cast Edge Tools in Rotary Furnace Steel . . . . .	68
BHATTACHARYA, U. K., ADAMS, C. M. and TAYLOR, H. F.—Hot-Tear Formations in Steel Castings . . . . .	675
BISHOP, H. F., ACKERLIND, C. G. and PELLINI, W. S.—Metallurgy and Mechanics of Hot Tearing . . . . .	818
BISHOP, H. F., MYSKOWSKI, E. T. and PELLINI, W. S.—Application of Chills to Increasing the Feeding Range of Risers . . . . .	389
BONSACK, W.—High-Strength Non Heat-Treated Aluminum Casting Alloys . . . . .	453
BOYLE, E. D. and WOLFER, H. R.—Mineral Perlite and Its Uses in the Foundry . . . . .	666
BROWN, F. and HAWKES, M. P.—Effect of Hydrogen on Graphitization . . . . .	635
BUGAS, J. S.—Industry's Responsibility to Youth . . . . .	1
BUNCH, T. C. and DALBEY, G. E.—Use of Aluminum Bronze in High Pressure Castings . . . . .	552
BURGDORFER, F. W.—Pattern Apprentice Training Program . . . . .	482
CAINE, J. B.—Rising Castings . . . . .	16
CARLSON, R. G. and SCOTT, W. B.—Melting in a High Speed Reverberatory Furnace . . . . .	624
CARTER, S. F.—Steel Desulphurization with Injected Carbide . . . . .	337
CARTER, S. F.—Production Experience with a Basic Cupola . . . . .	344
CHAKRABARTI, N. G.—Development of Steel Foundries in India . . . . .	84
COLTON, R. A., TURK, F. L. and LAVELLE, D. L.—Effect of Lead and Nickel on Grain Size of Certain Cast Copper-Base Alloys . . . . .	605
COLWELL, D. L.—Zinc in Aluminum Casting Alloys . . . . .	517
CORBEAU, W. C.—Air Furnace Refractory Practice in Cupola-Air Furnace Duplexing . . . . .	570
CUSTER, J. D. and McDOWELL, J. SPOTTS—Fundamentals of Foundry Refractories . . . . .	681
DALBEY, G. E. and BUNCH, T. C.—Use of Aluminum Bronze in High Pressure Castings . . . . .	552
DALTON, R. F.—Some Practical Applications of Permeable Metal Casting Plaster . . . . .	351
DEBOCK, M. A. and DOAT, R.—Metallurgical Blast Cupola . . . . .	44
DECROP, M. and ULMER, G.—Influence of the Nature of Oven Atmosphere on Drying of Molds and Baking of Foundry Cores . . . . .	234
DELHEY, W. F. and RADCLIFFE, J. C.—Air Pollution and the Cupola . . . . .	714
DEMLER, M. W.—Basic Refractories for Cupola Service . . . . .	385
DIRAN, L. M. and TAYLOR, H. F.—The Nature of Bonding in Clays and Sand-Clay Mixtures . . . . .	356
DIRAN, L. M., SHALER, A. J. and TAYLOR, H. F.—Flowability of Foundry Sand . . . . .	803
DISYLVESTRO, GEO., WYMAN, C. H. and FAIST, C. A.—Investigation of Hot Tears in Steel Castings, Part III—Hot Tear Investigation . . . . .	145
DOAT, R. and DEBOCK, M. A.—Metallurgical Blast Cupola . . . . .	44
DONHO, C. K. and DYKE, R. A. JR.—Substitution of Boron for Alloys in Cast Steels . . . . .	797
DUMMETT, N. M., KEECH, G. and BATTY, A. T.—Manufacture of Cast Edge Tools in Rotary Furnace Steel . . . . .	68
DUNPHY, R. P. and PELLINI, W. S.—Solidification of Nodular Iron in Sand Molds . . . . .	775
DUNPHY, R. P. and PELLINI, W. S.—A Solidification Dilatometer and Its Application to Gray Iron . . . . .	783
DYKE, R. A. JR., and DONHO, C. K.—Substitution of Boron for Alloys in Cast Steels . . . . .	797
EASTWOOD, L. W. and KURA, J. G.—Effects of Mold Materials on Leak Tightness and Mechanical Properties of 85-5-5-5 and 81-3-7-9 Alloy Castings . . . . .	247
EASTWOOD, L. W. and KURA, J. G.—Effect of Gating Practice on Leak Tightness of 85-5-5-5 and 81-3-7-9 Alloy Castings . . . . .	287
FAIRFIELD, H. H.—Quality Control Program for a Steel Jobbing Foundry . . . . .	536
FAIRFIELD, H. H., MACCONACHIE, JAS. and GRAHAM, H. F.—Reclaiming Used Molding Sand by Air Scrubbing . . . . .	296
FAIST, C. A., WYMAN, C. H. and DISYLVESTRO, GEO.—Investigation of Hot Tears in Steel Castings, Part III—Hot Tear Investigation . . . . .	145
FARRELL, DAN—Single Objective Safety . . . . .	282
FAY, E. L.—Foundry Management Looks at Statistical Quality Control . . . . .	511
FUQUA, J. H. and LILLIEQVIST, G. A.—Investigation of Hot Tears in Steel Castings, Part II—Evaluation of Hot Tear Test Casting . . . . .	141
GALLETTO, C.—Production of Heavy Gear Wheels in Spheroidal Graphite Cast Iron . . . . .	223
GINGERICH, E. M.—Heat Treatment of Magnesium Alloy Castings . . . . .	641
GRAHAM, H. F., FAIRFIELD, H. H. and MACCONACHIE, JAS.—Reclaiming Used Molding Sand by Air Scrubbing . . . . .	296
GREENIDGE, C. T., LOWNIE, H. W. JR. and KRAUSE, D. E.—How Iron and Steel Melt in a Cupola . . . . .	766
GRUBE, K., KURA, J. G. and JACKSON, J. H.—A Study of the Principles of Gating as Applied to Sprue-Base Design . . . . .	125
HAMAKER, J. C. JR., and WOOD, W. P.—Influence of Phosphorus on Hot Tear Resistance of Plain and Alloy Gray Iron . . . . .	501
HAMAKER, J. C. JR., WOOD, W. P. and ROTE, F. B.—Internal Porosity in Gray Iron Castings . . . . .	401
HAWKES, M. P. and BROWN, F.—Effect of Hydrogen on Graphitization . . . . .	635
HEINE, R. W. and LANGE, E. A.—A Test for Hot Tearing Tendency . . . . .	182
HEINE, R. W. and LANGE, E. A.—Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and other Properties of Malleable Iron . . . . .	169
HILDEBRAND, J. F. and STRIETER, F. P.—Mechanical Properties of Sand Cast Magnesium-Zinc-Zirconium Alloys . . . . .	595



HUIZENGA, D. I. and SPRAY, K. E.—Influence of Specimen Tube Loading and Riddle Size on Molding Sand Test Results	533
HUNSAKER, O. K. and PRICE, E. F.—Quality Control in a Malleable Iron Foundry	655
HURUM, F.—A Study of the Formation of Nodular Graphite	834
JACKSON, J. H., GRUBE, K. and KURA, J. G.—A Study of the Principles of Gating as Applied to Sprue-Base Design	125
JACOBSON, H. J.—New Methods in Metal Patternmaking	529
JOHNSON, G. W.—Investigation of Hot Tears in Steel Castings, Part I—Test Specimen for Evaluating Hot Tearing in Steel Castings	137
JOHNSON, H. A. and ROWE, E. A.—Effects of Cerium on Graphite Formation in Alloy Cast Iron	312
JUDGE, J. D.—Responsibility of Top Management in Training	274
KEECH, G., BATTY, A. T. and DUMMETT, N. M.—Manufacture of Cast Edge Tools in Rotary Furnace Steel	68
KEVERIAN, J., ADAMS, C. M. and TAYLOR, H. F.—Time of Formation of Spherulites in Hypo- and Hyper-Eutectic Irons	849
KEYSER, N. H. and MUNGER, H. P.—The Foundryman Looks at Air Pollution	364
KIERNAN, J. F. and ROPER, E. H.—Cutting with Ultra-High Purity Oxygen	539
KRANER, H. M.—Refractories for the Basic Cupola	262
KRAUSE, D. E., LOWNIE, H. W. Jr., and GREENIDGE, C. T.—How Iron and Steel Melt in a Cupola	766
KREINER, J. M.—Patterns for High Production Malleable and Steel Foundries	574
KURA, J. G. and EASTWOOD, L. W.—Effect of Gating Practice on Leak Tightness of 85-5-5-5 and 81-3-7-9 Alloy Castings	287
KURA, J. G. and EASTWOOD, L. W.—Effects of Mold materials on Leak Tightness and Mechanical Properties of 85-5-5-5 and 81-3-7-9 Alloy Castings	247
KURA, J. G., GRUBE, K. and JACKSON, J. H.—A Study of the Principles of Gating as Applied to Sprue-Base Design	125
KYLE, P. E., THORPE, R. G., RICCARDO, A. E. and WIDENER, P. L.—Investigation of Properties of Steel Sands at Elevated Temperatures	197
LANGE, E. A. and HEINE, R. W.—A Test for Hot Tearing Tendency	182
LANGE, E. A. and HEINE, R. W.—Effects of Melting Furnace Atmosphere on Fluidity, Hot Tearing Tendency, and other Properties of Malleable Iron	169
LANGUM, B. and SEISNER, J.—Practical Aspects of Olivine as a Molding Material	58
LARSSON, A. V.—Influence of Aluminum on Properties of Cast Gun Metal and Removal of Aluminum by Slag	75
LAVELLE, D. L.—Aluminum Sand Casting Defects—Their Identification, Causes and Corrections	371
LAVELLE, D. L., COLTON, R. A. and TURK, F. L.—Effect of Lead and Nickel on Grain Size of Certain Cast Copper-Base Alloys	605
LEPP, H., MONNERET, F. and RAME, P.—Refining and Elimination of Gases from Metals and Alloys	229
LEVI, W. W.—Melting Iron in a Basic-Lined Water-Cooled Cupola	740
LILLIEQVIST, G. A.—Role of the Research Foundry Unit	6
LILLIEQVIST, G. A. and FUQUA, J. H.—Investigation of Hot Tears in Steel Castings, Part II—Evaluation of Hot Tear Test Castings	141
LINDSAY, R. W. and SHAMES, A.—Effect of Percentage of Nodular Graphite on Certain Mechanical Properties of Magnesium-Treated Cast Iron	650
LIPSON, S. and ROSENTHAL, H.—Investment Casting of Aluminum	789
LONGARETTI, C. and NORIS, M.—New Process for Nodular Iron Production at Low Treatment Cost	101
LOWNIE, H. W. Jr., KRAUSE, D. E. and GREENIDGE, C. T.—How Iron and Steel Melt in a Cupola	766
MACCONACHIE, JAS., FAIRFIELD, H. H. and GRAHAM, H. F.—Reclaiming Used Molding Sand by Air Scrubbing	296
MATHIAS, J. N.—Core Boxes from Core Plugs	466
MCDOWELL, J. SPOTTS and CUSTER, J. D.—Fundamentals of Foundry Refractories	681
MEYER, C. W.—Refractory Practice as Applied to Malleable Duplexing	300
MONNERET, F., LEPP, H. and RAME, P.—Refining and Elimination of Gases from Metals and Alloys	229
MOREY, R. E., ACKERLIND, C. G. and PELLINI, W. S.—Effect of Binders and Additives on the High Temperature Properties of Foundry Sands	266
MORROGH, H.—Influence of Some Residual Elements and Their Neutralization in Magnesium-Treated Nodular Cast Iron	439
MUNGER, H. P. and KEYSER, N. H.—The Foundryman Looks at Air Pollution	364
MYSKOWSKI, E. T., BISHOP, H. F. and PELLINI, W. S.—Application of Chills to Increasing the Feeding Range of Risers	389
NORIS, M. and LONGARETTI, C.—New Process for Nodular Iron Production at Low Treatment Cost	101
PARKES, W. B.—Sand Control with Particular Reference to the Prevention of Scabbing	23
PASCHKIS, V.—Heat Flow in Moist Sand	163
PELLINI, W. S. and DUNPHY, R. P.—A Solidification Dilatometer and Its Application to Gray Iron	783
PELLINI, W. S. and DUNPHY, R. P.—Solidification of Nodular Iron in Sand Molds	775
PELLINI, W. S., BISHOP, H. F. and ACKERLIND, C. G.—Metallurgy and Mechanics of Hot Tearing	818
PELLINI, W. S., MOREY, R. E. and ACKERLIND, C. G.—Effect of Binders and Additives on the High Temperature Properties of Foundry Sand	266
PELLINI, W. S., MYSKOWSKI, E. T. and BISHOP, H. F.—Application of Chills to Increasing the Feeding Range of Risers	389
PORTER, L. F. and ROSENTHAL, P. C.—Effect of Sulphur on Fluidity of Gray Cast Iron	611
PORTER, L. F. and ROSENTHAL, P. C.—Factors Affecting Fluidity of Cast Iron	725
PORTEVIN, A. M.—Gases and Naturally Occurring (Congenital) Blowholes in Foundry Practice	109
PRICE, E. F. and HUNSAKER, O. K.—Quality Control in a Malleable Iron Foundry	655
RADCLIFFE, J. C. and DELHEY, W. F.—Air Pollution and the Cupola	714
RAME, P., LEPP, H. and MONNERET, F.—Refining and Elimination of Gases from Metals and Alloys	229
REIFDER, J. E.—Effect of Phosphorus Content on Graphitization Rate and Mechanical Properties of Black-Heart Malleable Iron	627
REYNOLDS, C. F. and TAYLOR, H. F.—Mechanical Properties of Spherulitic Graphite Cast Iron	687
RICCARDO, A. E., THORPE, R. G., WIDENER, P. L. and KYLE, P. E.—Investigation of Properties of Steel Sands at Elevated Temperatures	197
ROPER, E. H. and KIERNAN, J. F.—Cutting with Ultra-High Purity Oxygen	539
ROSENTHAL, H. and LIPSON, S.—Investment Casting of Aluminum	789
ROSENTHAL, P. C. and PORTER, L. F.—Effect of Sulphur on Fluidity of Gray Cast Iron	611
ROSENTHAL, P. C. and PORTER, L. F.—Factors Affecting Fluidity of Cast Iron	725
ROTE, F. B., HAMAKER, J. C. Jr., and WOOD, W. P.—Internal Porosity in Gray Iron Castings	401
ROWE, E. A. and JOHNSON, H. A.—Effects of Cerium on Graphite Formation in Alloy Cast Iron	312
SANDES, M. C.—Apprentice Training—It Is Needed	317
SAUNDERS, W. P., and STRIETER, F. P.—Alloying Zirconium to Magnesium	581

SCHALLER, G. S.—Olivine Application in the Foundry . . . . .	558
SCHMIDT, W. A. and TAYLOR, H. F.—Rising of Gray Iron Castings . . . . .	211
SCHNEIDEWIND, R. and WILDER, H. H.—Commercial Experience with Higher Silicon Nodular Irons . . . . .	322
SCHOPP, C. O. and ULMER, P. F.—Refractory Selection Applied to Batch-Type Air Furnaces . . . . .	497
SCOTT, W. F. and CARLSON, R. G.—Melting in a High Speed Reverberatory Furnace . . . . .	624
SELL, M. T.—Actual Application of Motion Pictures in Foundry Motion and Timestudy . . . . .	308
SHALER, A. J., TAYLOR, H. F. and DIRAN, L. M.—Flowability of Foundry Sand . . . . .	803
SHAMES, A. and LINDSAY, R. W.—Effect of Percentage of Nodular Graphite on Certain Mechanical Properties of Magnesium-Treated Cast Iron . . . . .	650
SIEBERT, W. H.—Practical Suggestions for the Building of Wood Patterns . . . . .	548
SISSENER, J. and LANGUM, B.—Practical Aspects of Olivine as a Molding Material . . . . .	38
SMITH, K. M.—How to Maintain Foundry Ventilation and Dust Collecting Systems . . . . .	485
SPRAY, K. E. and HUIZENGA, D. I.—Influence of Specimen Tube Loading and Riddle Size on Molding Sand Test Results . . . . .	533
STEPHENS, H. A.—A Study of the A.F.S. Fineness Test . . . . .	53
STRIETER, F. P. and HILDEBRAND, J. F.—Mechanical Properties of Sand Cast Magnesium-Zinc-Zirconium Alloys . . . . .	595
STRIETER, F. P. and SAUNDERS, W. P.—Alloying Zirconium to Magnesium . . . . .	581
TAYLOR, H. F. and ADAMS, C. M. JR.—A Simplified Analysis of Riser Treatments . . . . .	617
TAYLOR, H. F. and DIRAN, L. M.—The Nature of Bonding in Clays and Sand-Clay Mixtures . . . . .	356
TAYLOR, H. F. and REYNOLDS, C. F.—Mechanical Properties of Spherulitic Graphite Cast Iron . . . . .	687
TAYLOR, H. F. and SCHMIDT, W. A.—Rising of Gray Iron Castings . . . . .	211
TAYLOR, H. F., BHATTACHARYA, U. K. and ADAMS, C. M.—Hot-Tear Formations in Steel Castings . . . . .	675
TAYLOR, H. F., DIRAN, L. M. and SHALER, A. J.—Flowability of Foundry Sand . . . . .	803
TAYLOR, H. F., KEVERIAN, J. and ADAMS, C. M.—Time of Formation of Spherulites in Hypo- and Hyper-Eutectic Irons . . . . .	849
TETZLAFF, E. G.—Melt Department Incentive Plan . . . . .	432
THORPE, R. G., RICCARDO, A. E., WIDENER, P. L. and KYLE, P. E.—Investigation of Properties of Steel Sands at Elevated Temperatures . . . . .	197
TISDALE, N. F. JR., and WILSON, W. G.—Malleable Iron Annealing Time Reduced . . . . .	470
TURK, F. L., COLTON, R. A. and LAVALLE, D. L.—Effect of Lead and Nickel on Grain Size of Certain Cast Copper-Base Alloys . . . . .	605
ULMER, G. and DECROP, M.—Influence of the Nature of Oven Atmosphere on Drying of Molds and Baking of Foundry Cores . . . . .	234
ULMER, P. F. and SCHOPP, C. O.—Refractory Selection Applied to Batch-Type Air Furnaces . . . . .	497
VAN ORDER, DEAN—Standards for Rough Chipping and Removing Welds . . . . .	718
WALLEY, J. R.—Applied Waste Control Principles . . . . .	578
WEAVER, W. R.—The Why and Wherefores of Statistical Quality Control . . . . .	462
WEBER, H. J.—Ventilation at Non-Ferrous Melting and Pouring Operations . . . . .	563
WENNINGER, C. E.—Pneumatic Reclamation for Foundry Sands . . . . .	330
WESTOVER, J. A.—Pricing Castings Using Standard Costs . . . . .	756
WIDENER, P. L., THORPE, R. G., RICCARDO, A. E., and KYLE, P. E.—Investigation of Properties of Steel Sands at Elevated Temperatures . . . . .	197
WILDER, H. H. and SCHNEIDEWIND, R.—Commercial Experience with Higher Silicon Nodular Irons . . . . .	322
WILSON, W. G. and TISDALE, N. F. JR.—Malleable Iron Annealing Time Reduced . . . . .	470
WOLFER, H. R. and BOYLE, E. D.—Mineral Perlite and Its Uses in the Foundry . . . . .	666
WOOD, W. P. and HAMAKER, J. C. JR.—Influence of Phosphorus on Hot Tear Resistance of Plain and Alloy Gray Iron . . . . .	501
WOOD, W. P., HAMAKER, J. C. JR. and ROTE, F. B.—Internal Porosity in Gray Iron Castings . . . . .	401
WYCKOFF, L. B.—Effect of Slag on Furnace Lining . . . . .	525
WYMAN, C. H., FAIST, C. A. and DiSYLVESTRO, GEO.—Investigation of Hot Tears in Steel Castings, Part III—Hot Tear Investigation . . . . .	145
YOUNG, M. K.—Patternmaking to Compensate for Shrink Allowance . . . . .	477

